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ABSTRACT

This paper describes a delayed response experiment which tested children's memory for the location of a hidden object. Eight boys and eight girls at each of two age levels (25 and 37 months) were assigned to each of four experimental conditions and given eight trials in a 9-choice task. On each trial the child saw the object hidden in one of nine boxes, played with a toy for a 25-second delay period, then searched for the object. In one condition, only location cues were present and relevant for finding the object. In the other conditions, both location and picture cues were available. In these conditions, pictures were either: (1) redundant with location cues, so that both were relevant, (2) the solely relevant cues, or (3) irrelevant. Both age groups responded well on the basis of location cues alone. When picture cues were relevant and redundant with location, correct responses of 3-year-olds improved significantly, that of younger children only slightly. When picture cues alone were relevant, 3-year-olds performed well, but 2-year-olds did poorly. When picture cues were irrelevant and location relevant, the reverse occurred. These results indicate that there is a shift from reliance on location cues at age two to increased spontaneous utilization of pictorial cues by age three. (Author/BF)

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Pictures and Delayed Response at Ages Two and Three[1,2]

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Much needed information concerning memory processes in children between the ages of one and three can be obtained by observing their search for a hidden object. These localization tasks have been typically conducted using a delayed response paradigm in which the child is shown the location of a hidden object and is prevented from initiating search for a predetermined period of time. Using this paradigm, Babska (1965) investigated the utilization of specific cues in finding the object and suggested that two year olds rely primarily on the memory of spatial cues and three year olds on the memory of visual cues to direct their search. Remembering a color, size, or picture cue linked to the location of an object is seen as a more effective strategy for recall than having to rely on spatial cues to locate the object. Objects are not necessarily fixed entities which are associated with a particular place so that locating the object on the basis of its own visual characteristics or those associated with it, is a more reliable predictor of its eventual position than the space it occupies at a particular point in time.

Though Babska proposed that these developmental differences exist, only visual cues were included in her task, so a direct test of the child's utilization of spatial cues was not provided. Loughlin and Daehler (1973) did present both spatial and visual cues in a similar task and found that only the performance of children over three was facilitated by the addition of picture cues. These studies, then, indicate that at specific ages young children will encode and utilize certain cues to aid their search; however, neither

study made both cues available while requiring the utilization of a particular cue to find the object. A more sensitive measure of the child's primary reliance on the particular cue may be to see if one cue is utilized when the other is present and provides conflicting information.

In this study, eight boys and eight girls at each of two age levels, 25 and 37 months, were asked to find a hidden object under one of four different cue conditions. The apparatus used in the task consisted of nine boxes, arranged in a three by three matrix, on top of which were placed either blank white cards or picture cards. On each of eight test trials the child saw the object hidden in one of the nine boxes under a particular card, played with another toy for a twenty-five second delay period and then searched for the object. In the No Picture-Relevant Location condition, the blank white cards were placed on top of the boxes so that only spatial cues were available to find the object. In the Relevant Picture-Relevant Location condition the pictures were used to cover the boxes so both location and picture cues were available to the child. In the Relevant Picture-Irrelevant Location condition, pictures appeared on the boxes, but the baited box with the target picture was moved to a new location during the delay period. Thus, the picture served as the solely relevant cue for finding the object since location was no longer appropriate. For example, if the object was hidden with a picture of a cat in a particular location, it was moved to another location before the child searched. In the final condition, Irrelevant Picture-Relevant Location, pictures were present and the object remained where it was originally hidden, but the picture covering it was moved to a new location during the delay. Here, location cues were solely relevant in finding the object. If the object was originally hidden with the picture of the cat in a particular location, it remained in that location but a new picture was placed

over it.

The mean percentage of errorless retrievals as a function of age and condition can be seen in Figure 1. An analysis of variance revealed significant effects of Age ($F(1,64) = 10.99$, $p < .01$), Condition ($F(3,64) = 12.88$, $p < .001$), and an interaction between the two ($F(3,64) = 12.80$, $p < .001$). In general, three year olds performed better than two year olds, but these differences varied with condition. Planned comparisons (Bonferoni t-tests, one-tailed) indicated that for twenty-five month olds, performance in the Relevant Picture-Irrelevant Location condition was significantly lower than in the other three conditions, which did not differ from one another. For thirty-seven month olds, performance in the Irrelevant Picture-Relevant Location condition was significantly lower than in the other three conditions ($EW < .10$). For the older children, moreover, performance in the Relevant Picture-Relevant Location condition did not differ from that in the Relevant Picture-Irrelevant Location condition but was significantly greater than that in the No Picture-Relevant Location condition ($EW < .10$).

Analyses were also carried out to examine the types of errors that were made. Both age groups in the Relevant Picture-Irrelevant Location condition chose the location in which the object was originally hidden on the first two trials more often than expected by chance ($t(15) = 3.13$, $p < .05$; $t(15) = 2.08$, $p < .05$). When the child made an error in this condition he chose the location in which the object was first hidden rather than searching for the box with the appropriate picture. Only the older children, however, incorrectly chose the irrelevant picture cue significantly more often than expected by chance in the Irrelevant Picture-Relevant Location condition ($t(15) = 4.78$, $p < .001$). When these children made an error they tended to choose the picture with which the object was originally hidden rather than

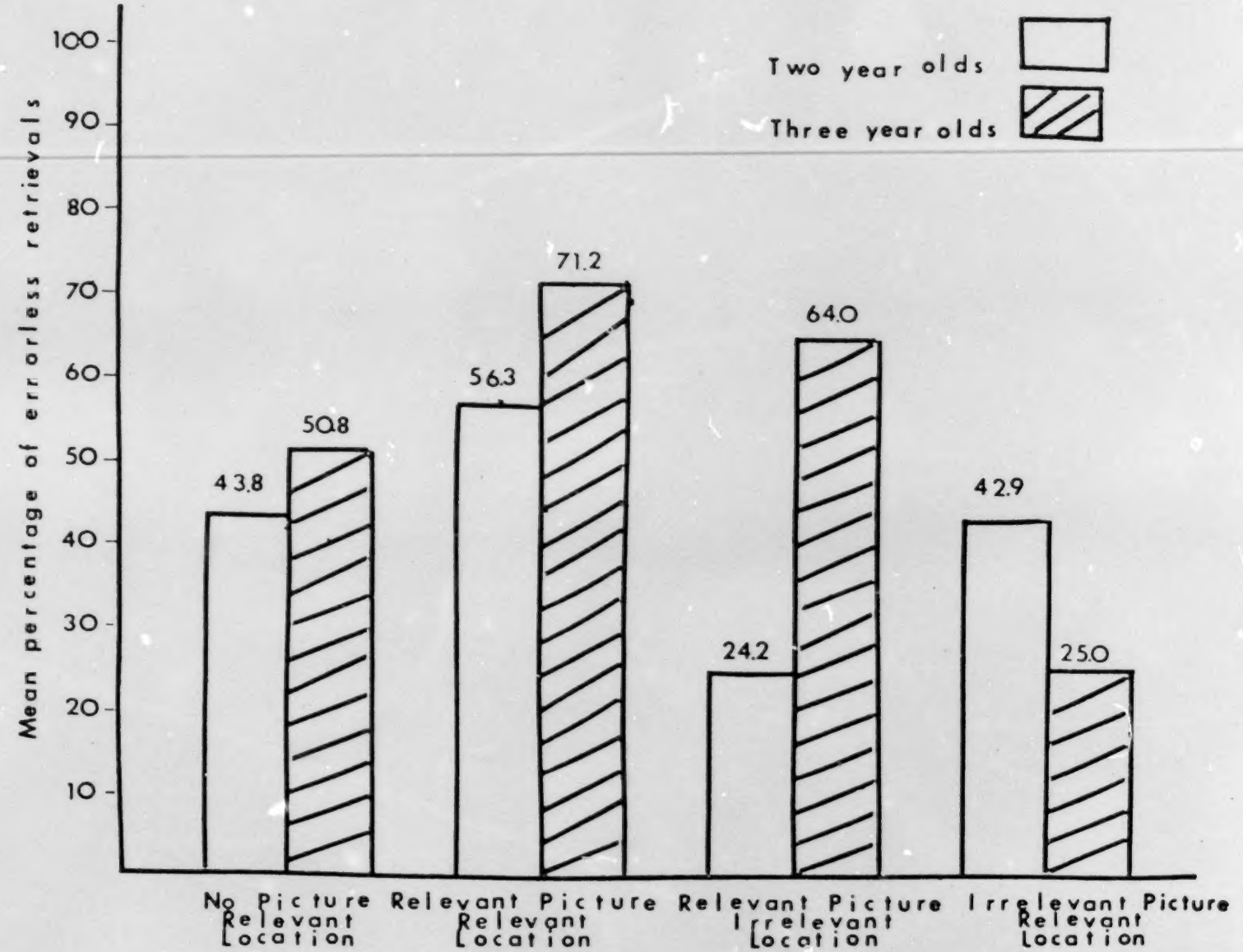

Figure 1. Mean percentages of errorless retrievals as a function of condition and age

searching at the appropriate location.

Two additional points about the data should be made. First, performance was above chance level for both age groups in all conditions. Secondly, each child was allowed to search for the object again if he was incorrect on the first choice. When performance over two choices was considered, improvement was noted and the differences between ages in the two irrelevant cue conditions were attenuated.

These results show that when two or three year olds can rely solely on location to find hidden objects they perform similarly, and well. If cues other than location are present and defined as relevant either by the child or experimenter, the delayed response task may become more difficult and the ability to utilize certain relevant cues vary at the different ages.

Thus, when relevant picture cues were added which were redundant with location the older child's initial response accuracy was significantly improved. The younger childen's performance was slightly improved but not significantly so. These findings demonstrated once again that only children over three years of age are likely to use pictorial cues which are redundant with location to find a hidden object.

When irrelevant information was present which conflicted with that first presented to the child, further evidence was obtained for differing developmental propensities to utilize positional and pictorial cues. When pictures served as the only appropriate cues for finding the objects and were not redundant with position, the younger children performed significantly less well than in all other conditions and less well than the older children in that condition.

In contrast to the younger children the three year olds performed as

well in the Relevant Picture-Irrelevant Location condition as when pictures were relevant and redundant with location. The three year olds efficientl utilized pictorial information even when it was the solely relevant cue and in conflict with position.

When pictures were irrelevant in the task and location was the relevant cue, each age group's performance continued to be consistent with the previous findings. The two year olds performed as well as they did in the other two relevant location conditions. They even performed at a reliably higher level than the three year olds in that condition. The older children's performance was significantly poorer than in each of the other three conditions, however, and only the three year olds chose the picture originally associated with the hidden object significantly above chance level. Even though it was inappropriate to choose the pictorial cues, the older children continued to rely on this information.

The above chance level performance, second choice improvement, and error types argue that at both age levels both locational and pictorial information is encoded; however, each age group clearly demonstrated a propensity to primarily utilize either pictorial or positional cues. Each age group clearly understood the task differently, and to the degree that specific conditions were congruent with these knowledge structures, good memory performance resulted. The three year olds were quite obviously representing the task as " remember the object is with that picture" and spontaneously and consistently utilizing pictorial information. For the two year olds, the game appeared to be "remember the object is in that place" and they relied heavily on location cues. The intriguing question of why the child's understanding changes in this way in the brief period between ages two and three is still unaswered.

References

Babska, Z. The formation of the conception of identity of visual characteristics of objects seen successively. In P.H. Mussen (Ed.), European research in cognitive development, Monographs of the Society for Research in Child Development, 1965, 30 (Serial No. 100), 112-124.

Loughlin, K.A. and Daehler, M.W. The effects of distraction and added perceptual cues on the delayed reaction of very young children. Child Development, 1973, 44, 384-388.

Footnotes

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[2] This paper was presented at the meetings of the Society for Research in Child Development in March, 1977.